MEDICINE

Vaccines by Ultraviolet

New method promises better agent for protection against bacteria, and virus diseases. Germs are killed in less than one second.

➤ A NEW METHOD for completely and almost instantly killing germs of both bacteria and virus classes with ultraviolet light has been developed by Dr. Sidney O. Levinson, Dr. Albert Milzer, Dr. Howard J. Shaughnessy, John L. Neal and Dr. Franz Oppenheimer, of the Michael Reese Hospital and the Illinois Department of Public Health.

The work, done under contract with the Office of Scientific Research and Development, is reported in the *Journal of the American Medical Association,* (June 24).

More powerful vaccines against a number of diseases seem likely to result from the work. Killed vaccines for typhoid fever, pneumonia type 1, and Salmonella enteritidis, one of the germs that causes food poisoning, have already been prepared.

"In preliminary scout experiments," the scientists report, these vaccines "appear to be equal or superior in antigenic potency to heat-killed vaccines prepared from the same bacterial suspensions."

Rabies vaccine produced by the new technic "consistently induced a higher degree of immunity in mice" than vaccines in which the germs had been killed by phenol. The vaccine did not lose its potency after six months' storage at a temperature somewhat above freezing.

Mice also acquired a high degree of immunity from a vaccine prepared by the same method against St. Louis encephalitis, popularly known as sleeping sickness.

A newly developed ultraviolet lamp was used. This lamp is a powerful source of both total and extreme ultraviolet light, the extreme being below 2,000 angstroms. Suspensions of bacteria and viruses containing about one billion germs in a teaspoon of fluid are killed in less than one second when exposed in continuously flowing thin films to this light.

While the new lamp killed 100% of the germs, two commercial ultraviolet lamps used under the same conditions killed only 18% to 20%. A third commercial lamp killed 98% of the bacteria but further investigation showed much of the killing was due to the heat generated by the lamp and not to its ultraviolet light.

Ultraviolet light has been used in the past to inactivate germs, but it was impossible with the old technics, the scientists state, to avoid over-irradiation. This results in destroying not only the germs but also their immunizing property. Too little irradiation is dangerous, since it may not destroy the disease-producing property. Ultraviolet irradiation has up to now, therefore, been impractical, the scientists point out, for production of uniformly safe and potent vaccines.

Science News Letter, July 1, 1944

MEDICINE

Chemicals Tested for Fighting Tuberculosis

➤ NEW CHEMICALS for fighting tuberculosis, which ranks with typhus, malaria and dysentery as a pestilence of war, are now being tried as fast as they come out of the chemical research laboratories.

Most promising of the many tested so far is promizole, a distant relative of sulfa drugs. Comparison of its effects with older chemicals on guinea pig tuberculosis was shown by Drs. William H. Feldman, H. Corwin Hinshaw and Frank C. Mann, of the Mayo Clinic, in an exhibit which won the gold medal at the meeting of the American Medical Association.

Promizole has been given to human patients, but scientists are so far unable to tell what the results will be. The drug is very difficult to prepare and each patient requires about one pound a month. This has limited the clinical trials.

Besides promizole, the antibiotics such as penicillin, gramicidin and other germ-fighting chemicals from molds, fungi and other microorganisms "have not been overlooked" in the search for a tuberculosis remedy, one of the scientists cautiously admitted.

Although scientists cannot yet tell which chemical this may prove to be, the Mayo Clinic group feels one eventually will be discovered.

Less hopeful, at least so far as sulfone chemicals such as diasone and promin are concerned, was the report of Dr. Harry J. Corper and Dr. Maurice L. Cohn, of the National Jewish Hospital at Denver. The effect of diasone on tuberculosis in guinea pigs, they find, is due to the drug's ability to deplete the oxygen supply of the guinea pig's blood and tissues. This retards the growth of the tuberculosis germs in the animals' bodies. Humans, however, are more sensitive to oxygen deficiency than guinea pigs. Doses of diasone sufficient to affect tuberculosis germs in human bodies, Dr. Corper believes, would be dangerous for the patient.

Science News Letter, July 1, 1944

MEDICINE

Ultraviolet Helps Reveal Chemistry of Vitamins

➤ ULTRAVIOLET light is helping scientists learn more about the complex chemical structure of vitamins, viruses and other proteins. As a result, viruses may be robbed of their disease-destroying power and made into vaccines to give resistance to disease.

These applications of physics to solution of biological problems for better health were reported by Prof. Gladys A. Anslow, of Smith College, to members of the American Physical Society meeting in New York.

Different chemicals absorb ultraviolet rays in different ways. Some absorb rays of one length, others absorb those of another length. This difference in absorption is apparently related to the structure of the molecules of the different chemicals. Some of the molecules

DUCK STAMP — Stamp collectors and sportsmen, as well as hunters, have eagerly awaited the issuance of this Federal migratory-bird hunting stamp for the 1944-45 season, taken from a drawing by Walter A. Weber.

have one or two of their bonds ruptured after irradiation by light having the same energy as that which the chemicals absorb.

Similarly, Prof. Anslow said, when light of a wavelength that is absorbed by a particular protein molecule shines on that protein the protein is denatured. Vitamins are decomposed by light of the wavelength they absorb. Viruses are made non-virulent, without coagulation of their protein and without destruction of their immunizing power, by the particular wavelengths they absorb.

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CHEMISTRY

"Slow" Rubber

Experiments have shown that synthetic rubber takes longer to snap back after stretching than natural rubber does. This is a test of quality.

➤ DELICATE experiments to measure the infinitesimal time it takes rubber to snap back after being stretched show that it takes a few thousandths of a second for natural rubber to retract, and a longer time for synthetic rubber. These facts were reported by Prof. Eugene Guth of the University of Notre Dame, at the meeting of the American Physical Society.

The speed at which rubber snaps back is a widely used test for the quality of rubber. Good rubber must have a fast snap-back. Snap is used in rubber factories to determine the degree of vulcanization.

Using a smoked drum revolving at the high speed of 50 miles an hour, high speed photography that takes several thousand pictures a second, and a scientific sling-shot, Prof. Guth and his associates saw rubber snap back at speeds of several hundred miles an hour.

Studying the pictures made as the rubber snapped back, they discovered a very peculiar phenomenon. The middle of a strip of rubber starts to move only after all rubber in front of it contracted to an unstretched state. The rubber contracts and ripples into an unstretched state in much the same way as an earthworm moves across the surface of the ground.

Synthetic rubbers like Buna S and Butyl were found to be more sluggish than natural rubber. Prof. Guth expressed the hope that through the study of rubber snap-back, snappier and better synthetic rubbers may be developed.

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Stretched Rubber Is Hot

Natural and synthetic rubbers generate heat when they are stretched fast. This fact was revealed by Prof. Guth and S. L. Dart who used an ultra-high-speed temperature recorder that can record a change of 30 degrees Fahrenheit in less than a second in their tests.

A simple demonstration of the temperature change can be made by taking an ordinary rubber band, stretching it fast, then touching it to the face or lips; it will feel warm.

Tests made on synthetic Butyl rubber showed that if a strip is stretched to nine times its original length very rapidly, there is a rise in temperature of 20 degrees Fahrenheit.

Heat generation is another quality index of synthetic rubbers. The higher the heat generation and the earlier it develops, the better is the rubber. High heat generation is due to its crystallization on stretching rapidly.

Mathematical studies on the sling-shot tests and the heat generation tests were made by Dr. Hubert M. James of Purdue University.

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BIOLOGY

Rare South American Toad Lays Pick-A-Back Eggs

➤ A SURINAM toad, a rare species from South America, has produced a batch of eggs at the National Zoological Park in Washington. This is an event so unusual that the last time it happened —ten years ago—a leading New York zoologist made a special trip to Washington just to see it, Dr. William M. Mann, director of the zoo, reported.

The Surinam toad, unlike most toads, does not lay her eggs in the water, although (again unlike most toads) she lives practically altogether in the water. Instead, she normally deposits them on her own back, with the assistance of the male. The skin of her back grows into a pocket around each individual egg, and a little horny lid forms over the top. There will be 30 or 40 of these sealed pockets.

Within them the eggs hatch, and the tiny tadpoles that emerge remain thus sealed up until they have gone through their whole development. But all this requires help from the male and this time he seemed unwilling to cooperate.

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